



Coastal Engineering Technical Note

SHORE PROTECTION SELECTION CRITERIA

PURPOSE: To aid in the selection of shore protection structures by briefly comparing the functional applications and limitations of: bulkheads, seawalls, revetments, groins, and protective beaches. This Coastal Engineering Technical Note (CETN) introduces a series of five notes on these particular structures that are primarily for use by Corps personnel who do not have a background in coastal engineering. This series of notes provide the type of information needed for answering inquiries from the general public concerning the function and construction of shore protection alternatives.

DISCUSSION: The Table presents some of the selection factors for five of the most common shore protection alternatives. Cost comparisons are not included in this discussion. Shore protection structures covered here are defined as follows:

1. Bulkheads are vertical earth-retaining structures;
2. Seawalls are wave-resistant structures;
3. Revetments are wave-protection structures placed on an existing sloping embankment;
4. Groins are walls constructed perpendicular to the shore for the purpose of trapping sand and for stabilizing an existing or artificially-filled beach; and
5. Protective beaches are sand beach fills usually constructed to replace eroding beach material.

The table lists some of the major functions of these coastal structures and presents the effects the coastal environment has on these structures.

The CETN on each structure should be consulted for more detail.

REFERENCES:

- U.S. ARMY, CORPS OF ENGINEERS, COASTAL ENGINEERING RESEARCH CENTER, Fort Belvoir, VA., 1981:
- CETN-III-7, "Bulkheads - Their Applications and Limitations"
 - CETN-III-8, "Seawalls - Their Applications and Limitations"
 - CETN-III-9, "Revetments - Their Applications and Limitations"
 - CETN-III-10, "Groins - Their Applications and Limitations"
 - CETN-III-11, "Protective Beaches - Their Applications and Limitations"

Table. Criteria for Selecting Coastal Structures

FUNCTION	TYPE OF STRUCTURE				
	Bulkheads CETN-III-7	Seawalls CETN-III-8	Revetments CETN-III-9	Groins CETN-III-10	Protective Beaches CETN-III-11
Applicability to small projects	Yes	Yes	Yes	No ¹	No
Recreational beach provision	No	No	No	Limited unless filled	Yes
Backshore ² erosion prevention	Yes (secondary)	Yes	Yes	No unless filled	Yes ³
Backshore wave protection	Yes (secondary)	Yes	Yes	Limited if filled	Limited
Backshore slope retention	Yes	Yes (secondary)	Limited	No	No
EFFECTS OF ENVIRONMENTAL CONDITIONS	Bulkheads	Seawalls	Revetments	Groins	Protective Beaches
Beach profile with flat backshore slope	Negates earth retaining function	Negates secondary earth retaining function	None	None	None
Beach profile with steep backshore slope	Usual condition for earth retaining function	Earth retaining capability may be exceeded	Bank may need to be graded	None	None
Beach profile with flat foreshore ⁴ slope	None	None	None	Longer length structure required	Lower fill volume required
Beach profile with steep foreshore slope	Larger wave with more force could reach the structures			Higher structure required	Higher fill volume required
Waves	Size and strength of structure are dependent on wave height				Steep ⁵ waves erode - Flat ⁶ waves help maintain
	Reflected waves cause beach erosion				
Longshore sand movements	None	None	None	Provides fill for trapping - High volume required for success	Longshore currents distribute fill along shores
Wind-blown sand	None	None	None	Provides fill for trapping	None

¹In some cases a single structure may suffice, but usually a series of groins are required.

²That upper zone of the beach which is acted upon only during severe storms.

³Provided periodic renourishment is maintained.

⁴That part of the shore that is ordinarily exposed to the uprush and backrush of wave action as the tides rise and fall.

⁵Distance between successive crests are 10 to 20 times their height.

⁶Distance between successive crests are 30 or more times their height.